



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/EP99/10492 <b>(22) International Filing Date:</b> 30 December 1999 (30.12.99) <b>(30) Priority Data:</b> 99200241.0 28 January 1999 (28.01.99) EP <b>(71) Applicant (for all designated States except US):</b> SOCIETE DES PRODUITS NESTLE S.A. [CH/CH]; P.O. Box 353, CH-1800 Vevey (CH). <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> CHMIEL, Oliver [DE/CH]; Chemin des Ecoliers 3, CH-1350 Orbe (CH). FURRER, Marc [CH/CH]; Chemin de l'Ancien-Stand 2, CH-1807 Blonay (CH). MAIER, Hanspeter [DE/DE]; Herweghstrasse 15, D-64546 Mörfelden-Walldorf (DE). WYSS, Heinz [CH/CH]; Chisemattweg 12, CH-3672 Oberdiessbach (CH).		<b>(81) Designated States:</b> AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> AROMATISED SOLUBLE CREAMER POWDER  <b>(57) Abstract</b> <p>An aromatised, soluble creamer powder. The creamer particles are formed of a matrix of proteins, fats, carbohydrates, and an aroma system. The aroma system is formed of aqueous coffee aroma components and soluble coffee solids. The soluble coffee solids stabilise the instable aqueous coffee aroma components. The creamer powder may be used in soluble coffee beverage powders.</p>		

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## Aromatised Soluble Creamer Powder

### Field of the Invention

5           This invention relates to a soluble creamer powder which contains a coffee aroma. The invention also relates to a process for producing the soluble creamer powder.

### Background to the Invention

10           Soluble creamer powders are well known and are widely used; particularly as coffee or tea creamers. Typically these creamer powders contain protein, fats and sweeteners but other ingredients such as emulsifiers, stabilisers and buffers may also be included. Further, the creamers come in various forms such as milk-based creamer powders, non-dairy creamer powders, and gassed creamer  
15           powders. These creamer powders are typically produced by subjecting a solution containing their components to spray-drying.

          When used as a component of coffee beverage powders, the creamer powders may be aromatised to provide the beverage produced upon  
20           reconstitution with improved coffee aroma. If natural coffee aroma is used to aromatise the creamer powder, the natural coffee aroma is in the form of organic coffee aroma components; usually carried in coconut oil. An example of such a creamer powder is described in European patent application No 0885566.

          The aqueous aroma components of natural coffee aroma are not used to  
25           aromatise creamer powders since the aqueous aroma components are too unstable. However, the aqueous aroma components have a good aroma profile and, especially when combined with the organic aroma components, may provide a more complete aroma profile.

30           Therefore there is a need for a creamer powder which is relatively stable and which contains aqueous coffee aroma components.

### Summary of the Invention

35           Accordingly, in one aspect, this invention provides an aromatised, soluble creamer powder comprising a matrix including proteins, fats, carbohydrates, and

an aroma system, the aroma system comprising aqueous coffee aroma components and a stabilising amount of soluble coffee solids.

It is surprisingly found that a creamer powder which contains aqueous coffee aroma components and which has good stability, may be prepared by using soluble coffee solids to stabilise the aqueous coffee aroma components. Further, the creamer powder has good aroma.

Preferably, the the ratio of aqueous coffee aroma components to soluble coffee solids in the aroma system is about 20:1 to about 1:1. For example, the ratio of aqueous coffee aroma components to soluble coffee solids in the aroma system may be about 10:1 to about 3:1.

The creamer powder preferably contains about 0.05% to about 0.5% by weight of aqueous coffee aroma components; more preferably about 0.1% to about 0.3% by weight. The creamer powder may contain about 0.01% to about 0.1% by weight of soluble coffee solids in the aroma system.

Preferably the aqueous coffee aroma components include highly volatile aqueous aroma components which condense at temperatures less than about 0°C.

The creamer powder may be gassed for foaming a foam upon reconstitution. Further, the creamer powder may further comprise an organic aroma substrate containing organic coffee aroma components.

In a further aspect, this invention provides a soluble beverage powder comprising about 10% to about 30% by weight of soluble coffee solids; and about 70% to about 90% by weight of a creamer powder as defined above.

In a yet further aspect, this invention provides a process for preparing an aromatised, soluble creamer powder, the process comprising:

- cryogenically collecting coffee aroma components;
- separating aqueous coffee aroma components from organic coffee aroma components;
- adding soluble coffee solids to the aqueous coffee aroma components to provide an aqueous aroma solution;
- adding the aqueous aroma solution to a creamer concentrate which contains proteins, fats, and carbohydrates to provide an aromatised solution; and
- drying the aromatised solution to powder.

Detailed Description of Preferred Embodiments of the Invention

Embodiments of the invention are now described by way of example only. The invention is based upon the discovery that a stable, aromatised, soluble  
5 creamer powder may be provided by incorporating into the creamer powder aqueous coffee aroma components and soluble coffee solids. It is found that the soluble coffee solids stabilise the aqueous coffee aroma components and the creamer powder.

10 The aqueous coffee aroma components are natural aroma components which may be collected during the preparation of soluble coffee powder. This may be done by standard procedures for collecting coffee aroma components or by suitably modifying the standard procedures. Preferably, the natural aroma components include highly volatile aroma components. Highly volatile aroma components are those which condense at a temperature below about 0°C.

15 To collect highly volatile aroma components, the standard procedures usually entail flushing volatile aroma components from the coffee during processing using an inert carrier gas such as nitrogen. The aroma-laden carrier gas is then chilled to temperatures lower than about -40°C, and sometimes as low as about -195°C, to cause the aroma components to condense. The condensed  
20 aroma components are then collected. The condensed aroma components are then usually absorbed into an aroma substrate; usually an oil. Alternatively, the aromas may be absorbed into the aroma substrate during condensation. Suitable standard procedures are disclosed in, for example, US patents 3823241, 5030473, and 5222364 (the disclosures of which are incorporated by reference).

25 However, in the standard procedures described above, the aromatised aroma substrate obtained contains both aqueous and organic aroma components. In general, the aqueous components are then removed and often discarded because they instable and cause instability problems. This leaves the aroma substrate containing substantially only organic aroma components. However, instead of  
30 discarding these aqueous components, these components are collected in the form of an aqueous aroma solution. Shortly after collection, the aqueous aroma components are stabilised by adding a suitable amount of soluble coffee solids to them. Ordinarily, an amount of about 5% to about 50% by dry weight of soluble coffee solids may be added; preferably about 10% to about 30% by dry weight.  
35 For example, about 20% by dry weight of soluble coffee solids may be added to

the aqueous aroma components. The resulting aqueous aroma solution therefore contains water, aqueous aroma components, and soluble coffee solids.

The aqueous aroma solution is then added to the other components making up the creamer powder prior to drying of the components. Sufficient aqueous  
5 aroma solution may be added such that the aqueous coffee aroma components comprise about 0.05% to about 0.5% by weight of the creamer powder; for example about 0.1% to about 0.3%. The soluble coffee solids comprise about 0.01% to about 0.1% by weight of the creamer powder.

The remaining components are the creamer powder may be standard.  
10 Ordinarily, the remaining components include proteins, fats, and carbohydrates forming sweeteners or bulking agents. The amounts of these components may vary depending upon the desired characteristics of the creamer powder.

For example, the creamer powder may contain about 15% to about 30% by weight of non-fat milk solids; about 5% to about 20% by weight of sweet whey;  
15 about 5% to about 25% by weight of a suitable edible oil or fat such as coconut oil, and about 20% to about 70% by weight a suitable food grade sweetener. Suitable sweeteners include carbohydrates such as glucose syrup, corn syrup, sucrose, dextrose, fructose, maltodextrin, and the like, and mixtures of these carbohydrates. Glucose syrup is particularly suitable, especially syrups having a  
20 DE in the range of about 35 to about 42. An example of such a creamer powder is described in European patent application No 0885566; the disclosure of which is incorporated by reference.

As another example, the creamer powder may contain about 40% to about 70% by weight of a sweetener as described above, about 0.5% to about 6% by  
25 weight of a water-dispersible or water-soluble protein such as sodium caseinate, and about 25% to about 45% by weight of an edible oil having a bland flavour and a melting point below 10°C. Especially preferred are vegetable oils in which the fatty acid moieties in the triglyceride comprise at least about 80% by weight of oleic acid and the mass ratio of oleic acid to linoleic acid is about 1:0.01 to  
30 about 1:0.09. An example of such a creamer powder is described in PCT patent application No WO 98/07329; the disclosure of which is incorporated by reference.

As a further example, the creamer powder may contain about 5% to about 16% by weight of milk proteins, about 16% to about 62% by weight of lactose,  
35 about 0.2 to about 28% by weight of fats, and up to about 60% by weight of carbohydrates other than lactose. Examples of these creamer powders are

described in US patent 4748040; the disclosure of which is incorporated by reference.

The creamer powders may also contain addition ingredients are desired or required. Examples of additional ingredients include artificial sweeteners, surfactants, and the like.

Suitable artificial sweeteners include saccharin, cyclamates, acetosulfame, L-aspartyl based sweeteners such as aspartame, and mixtures of these. If an artificial sweetener is used, it is suitably combined with bulking agents such as maltodextrins and polydextrose.

Suitable surfactants include monoglycerides, distilled monoglycerides, diglycerides, glycerol monostearates, sorbitol monostearates, esters or carbocyclic acids with mono- and di-glycerides, monosodium phosphate derivatives of mono- and di-glycerides, lecithin, diacetyl tartaric acid esters of mono-diglycerides (data esters), sorbitan esters, diacetyl tartaric acids esters of mono- and di-glycerides, succinylated mono- and di-glycerides, acetylated mono- and di-glycerides, hydroxylated lecithin, propylene glycol mono- and di-esters of fatty acids, polyglycerol esters of fatty acids, lactic esters of fatty acids, and mixtures thereof.

The creamer powder may also contain suitable stabilisers; for example dipotassium phosphate and sodium citrate. If stabilisers are used, the amount of stabilisers used may be in the range of about 0.1% to about 5% by weight of the creamer powder.

Suitable flavouring agents, colouring agents, flowing agents, antioxidants, and the like may also be included as desired. A suitable flowing agent is sodium silica aluminate. A possible flavouring and colouring agent is soluble coffee solids.

The creamer powder may be produced by any suitable technique. For example, a standardised solution may be prepared by combining the protein sources and fat sources in selected proportions to obtain a solution of desired fat and solids content. Water may be added as necessary. The sweetener may be dissolved in the standardised solution. The standardised solution is then heat treated; for example at about 105°C for about 5 seconds. Then the standardised solution is concentrated by evaporation; usually to a total solids concentration of about 40 to about 60 % by weight. If desired, the concentrated solution may be homogenised.

If it is desired to have a creamer powder which produces a foamed cream upon reconstitution, the concentrated solution is then gassed by injecting a gas such as air, nitrogen or carbon dioxide into it. This may be done, for example, at a pressure of about 100 to 400 kPa above the pressure of the homogenised solution.

Whether or not the concentrated solution is gassed, the aqueous aroma solution is added to the concentrated solution immediately prior to drying of the concentrated solution. This offers the advantage of reducing aroma loss during processing.

If desired, a standard aroma substrate containing organic aroma components may also be added to the concentrated solution immediately prior to drying.

The concentrated solution is then pumped to the spray nozzle of a spray drier, usually at a pressure of about 2.5 MPa to about 8 MPa, and sprayed. Hot air at a temperature of about 200°C to about 400°C is then used to dry the droplets. If desired, a device (such as a screen) may be placed over the hot air inlet to break up the incoming hot air stream into many secondary streams. This offers the advantage of reducing bursting of the droplets of concentrated solution.

The creamer powder obtained may then be agglomerated if desired. Any suitable agglomeration procedure may be used; for example, using the procedure described in US patent 5,400,972 (the disclosure of which is incorporated by reference).

Further suitable aroma substrates may be mixed into the soluble beverage powder at this stage if desired. Powdered aromas are particularly suitable to be added at this stage. Any desired sweeteners, stabilisers, flavouring agents, and the like may also be mixed in at this stage.

The creamer powder thus obtained may then be mixed with a soluble coffee powder to provide a soluble coffee beverage product. The soluble coffee powder may be any spray- or freeze-dried coffee powder. Further, if desired, the soluble coffee powder may contain coffee surrogates such as chicory. Such coffee powders are commercially available or may be produced by conventional extraction and drying techniques. If desired, the coffee powder may be in the form of an agglomerated powder. Preferably the soluble coffee powder comprises about 10% to about 30% by weight of the soluble coffee beverage product; for example about 10% to about 20% by weight.



Example 1

Coffee aroma is captured according to the process described in US patent 5222364 in a coffee oil. The coffee oil is subjected to decanting to obtain an organic phase and an aqueous phase. The organic phase contains coffee oil and organic aroma components. The aqueous phase contains water and aqueous aroma components.

Soluble coffee solids are added to the aqueous phase in an amount of about 20% by dry weight of the aqueous. The resulting aqueous aroma solution is temporarily stored under cold room conditions.

A creamer powder is produced from a standardised solution containing about 25% of non-fat milk solids, about 10% of sweet whey powder, about 34% of glucose syrup, about 13% of sucrose and about 14% of coconut fat. The percentages are on the basis of dry weight. The standardised solution is preheated to 85°C in a plate heat exchanger and then heated to 105°C for 5 seconds by injection of steam. The heated solution is then concentrated to a solids content of about 48 to about 50% by weight. The concentrated solution is cooled to about 40°C and allowed to remain at this temperature for about 10 minutes.

The concentrated solution is heated to 75°C in a plate heat exchanger and the aqueous aroma solution is mixed into the concentrated solution. Sufficient aqueous aroma solution is added to provide about 0.3% by dry weight of aqueous aroma components. The aromatized concentrated solution is then transferred to a spray drying tower. Nitrogen is injected into the aromatized concentrated solution prior to the spray drying tower at a pressure of about 3 bar. The gassed solution is then pumped at a pressure of 7 MPa to the nozzle of the spray-drying tower.

In the spray drying tower, the gassed solution is dried by spraying with air at 335°C under a pressure of 15.7 kPa on entry. The primary air stream is broken up into small secondary turbulent streams under a pressure of about 7.9 kPa by a screen placed at the concentrate nozzle.

The creamer powder is then mixed with soluble coffee powder to provide a soluble coffee beverage product. The soluble coffee beverage product contains about 15% by weight of soluble coffee powder and about 85% by weight of the beverage creamer powder.

About 12g of the powder is placed in a glass beaker and 150 ml of water at 85°C is added with stirring. The resulting beverage has a light, fluffy and stable foam upon a liquid of good, brown coffee colour. No lumping is observed. The beverage has a good coffee aroma and flavour.

### Example 2

The soluble coffee beverage product of example 1 is packed into single serving sachets. The sachets are stored at room temperature for 3 months.

Several sachets are opened and sniffed by a trained panel. The powder is considered to have a good aroma.

Further sachets are opened. Each sachet, containing about 12g of the powder, is emptied into a separate glass beaker and 150 ml of water at 85°C is added with stirring. The resulting beverages have a light, fluffy and stable foam upon a liquid of good, brown coffee colour. The beverages are tasted and found to have good coffee aroma and flavour. No stability problems are detected.

### Example 3

An amount of 460 kg of standardised milk containing 17.3 kg of milk fat and 40.28 kg of non-fat solids is prepared. A 10% aqueous solution containing 0.4 kg of  $\text{Na}_2\text{HPO}_4$  is added, followed by 39.7 kg of lactose dissolved in 150 kg of lukewarm water.

The mixture is preheated to 80°C in a plate heat exchanger and then heated to 115°C by injection of steam for 5 seconds. The mixture is then concentrated by evaporation to a solids content of 51%. After a dwell time of about 10 minutes at 43°C, the concentrate is reheated to 75°C by injection of steam and left for about 5 minutes. The mixture has a solids concentration of 50%.

Sufficient aqueous aroma solution is added to the mixture to provide about 0.3% by dry weight of aqueous aroma components. Nitrogen under a pressure of about 300 kPa is then injected into the mixture. The mixture is then pumped under a pressure of 6.8 MPa to the nozzle of a spray-drying tower where it is dried by spraying with air at 330°C at a pressure of 15.7 kPa on entry. The primary air stream is broken up into small secondary turbulent streams at a pressure of about 7.9 kPa by a screen at the spraying nozzle for the mixture.

The creamer powder is then mixed with soluble coffee powder to provide a soluble coffee beverage product. The soluble coffee beverage product contains about 15% by weight of soluble coffee powder and about 85% by weight of the beverage creamer powder.

- 5 About 12g of the powder is placed in a glass beaker and 150 ml of water at 85°C is added with stirring. The resulting beverage has a light, fluffy and stable foam upon a liquid of good, brown coffee colour. No lumping is observed. The beverage has a good coffee aroma and flavour.

10 Example 4

- A creamer powder is produced from a standardised solution containing non-fat milk solids, sweet whey powder, and coconut fat. The standardised solution is preheated to about 85°C in a plate heat exchanger and then heated to 105°C for 15 5 seconds by injection of steam. The heated solution is then concentrated to a solids content of about 48% to about 50% by weight in a falling film evaporator.

- The temperature of the concentrated creamer solution is adjusted to about 70°C in a plate heat exchanger and a coffee solution is added to the concentrated creamer solution. The coffee solution has a solids concentration of about 45% by 20 weight. Sufficient coffee extract is added such that the soluble coffee solids in the creamer powder provide about 15% by weight of the final product.

- The mixture is heated to about 105°C for about 10 seconds by injection of steam. An aqueous aroma solution of example 1 is mixed into the concentrated solution. Sufficient aqueous aroma solution is added to provide about 0.3% by 25 dry weight of aqueous aroma components. The mixture is then homogenised in two stages; at about 11 MPa and then at about 5MPa. The homogenised mixture is transferred to a spray drying tower and dried by spraying with air at 335°C under a pressure of 15.7 kPa on entry.

- The creamer powder is then mixed with soluble coffee powder to provide a 30 soluble coffee beverage powder. The soluble coffee beverage powder contains about 15% by weight of soluble coffee powder and about 85% by weight of the creamer powder. Therefore the total amount of soluble coffee solids present is about 30% by weight. The soluble beverage powder is substantially homogeneous in colour.

- 35 About 12g of the soluble coffee beverage powder is placed in a glass beaker and 150 ml of water at 85°C is added with stirring. The resulting beverage has a

good, brown coffee colour and a good coffee aroma and flavour. A creamy mouthfeel is present. No flocculation is observed.

5 It will be appreciated that numerous modifications and variations may be made to the preferred embodiments described above without departing from the scope of the invention.

Claims

1. An aromatised, soluble creamer powder comprising a matrix including proteins, fats, carbohydrates, and an aroma system, the aroma system comprising aqueous coffee aroma components and a stabilising amount of soluble coffee solids.
2. A creamer powder according to claim 1 in which the ratio of aqueous coffee aroma components to soluble coffee solids in the aroma system is about 20:1 to about 1:1.
3. A creamer powder according to claim 2 in which the ratio of aqueous coffee aroma components to soluble coffee solids in the aroma system is about 10:1 to about 3:1.
4. A creamer powder according to any of claims 1 to 3 which contains about 0.05% to about 0.5% by weight of aqueous coffee aroma components.
5. A creamer powder according to claim 4 which contains about 0.01% to about 0.1% by weight of soluble coffee solids in the aroma system.
6. A creamer powder according to any of claims 1 to 5 in which the aqueous coffee aroma components include highly volatile aqueous aroma components which condense at temperatures less than about 0°C.
7. A creamer powder according to any of claims 1 to 6 which is gassed for foaming a foam upon reconstitution.
8. A creamer powder according to any of claims 1 to 7 further comprising an organic aroma substrate containing organic coffee aroma components.
9. A soluble beverage powder comprising about 10% to about 30% by weight of soluble coffee solids; and about 70% to about 90% by weight of a creamer powder of any of claims 1 to 8.

10. A process for preparing an aromatised, soluble creamer powder, the process comprising:
- cryogenically collecting coffee aroma components;
  - separating aqueous coffee aroma components from organic coffee aroma
  - 5 components;
  - adding soluble coffee solids to the aqueous coffee aroma components to provide an aqueous aroma solution;
  - adding the aqueous aroma solution to a creamer concentrate which contains proteins, fats, and carbohydrates to provide an aromatised solution; and
  - 10 drying the aromatised solution to powder.

# INTERNATIONAL SEARCH REPORT

International Application No.  
PCT/EP 99/10492

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A23C11/04 A23C11/08 A23F5/40

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A23C A23F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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☒ Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search

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Fax: (+31-70) 340-3016

Authorized officer

Vuillamy, V

# INTERNATIONAL SEARCH REPORT

Inter. Patent Application No.  
PCT/EP 99/10492

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>US 5 222 364 A (L. CARNS) 29 June 1993 (1993-06-29) cited in the application -----</p>	



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Information on patent family members

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